

Botanical Description, Diversity Resources, Distribution and Present Ecological Status of *Luisia* Gaudichaud -A Horticulturally less known Epiphytic Orchid Species of Darjeeling

Rajendra Yonzone and Samuel Rai*

Department of Botany, St. Joseph's College, P.O. North Point,
District Darjeeling 734 104 (West Bengal)

ABSTRACT

The present paper deals with four horticulturally less known *Luisia* Orchid species diversity resources, distribution and present ecological status in Darjeeling Himalaya of India. Of them, two are sparse, one is rare and another one is threatened status at present in study regions. This attempt is the first step to correct taxonomic identification to workout currently accepted botanical names with ecological status, voucher specimen numbers, habitat, altitudinal ranges, phenology and local and geographical distribution of *Luisia* species in the regions.

Key words: *Luisia* Orchid Species, Diversity Resources, Distribution, Present Status, Darjeeling Himalaya.

INTRODUCTION

Orchids are considered to be the most highly evolved in the floral specialization and diversified form among the monocotyledons. In India, Orchids form 9% of our flora and are the largest family of higher plants. It is estimated that about 25,000 –35,000 species with 800 – 1,000 genera are distributed throughout the world. About 1300 species with 140 genera of Orchid species are found in India with temperate Himalayas as their natural home (Yonzone and Kamran, 2008). The region is rich in Orchid diversity and harbour a number of species (Yonzone *et al.* 2012).

Darjeeling Himalaya is the northernmost part of the state of West Bengal, India. It is triangular in shape extending over an area of 3254.7 sq.kms. It is bordered by Sikkim in the North, Terai and Dooars in the South, Bhutan in the East and Nepal in the West. The Sub-Divisions of Darjeeling are Darjeeling, Kalimpong, Kurseong and Siliguri (Fig. 1). The Darjeeling district has two topographical features. Darjeeling, Kalimpong and Kurseong form the hill areas whereas Siliguri is stationed at the foot hill giving way to vast

stretches of the plains. The hilly region covers 2320 sq.km. and the remaining 934.75 sq.km. of the area falls under Terai and plains. The altitudinal



Fig. 1. Location of Darjeeling district (study area) of West Bengal, India

*Programme Coordinator, Krishi Vigyan Kendra, Uttar Banga Krishi Viswavidyalaya, Darjeeling, West Bengal.
Corresponding author e-mail: ryonzone99@gmail.com

variations of the district ranges from 150m at Siliguri to 3636m at Sandakphu – Phalut with a sharp physiographic contrast between the plains and the mountainous regions. A trijunction of boundaries of Nepal, Sikkim and India is formed at the peak of Phalut (3600 m). In the present investigation, the current status of *Luisia* genus of Orchid available in Darjeeling Himalaya has been carried out through the survey of national parks, forest area and far-flung villages of the region to find out the present status of the species.

Botanical Description

Plants epiphytic, climbing. Stem often branched at base giving a tufted habit, some with a single short. Leaves distant, terete, linear. Inflorescence axillary, racemose, densely, subsessile, fewer than 10-flowered; peduncle and rachis attenuate. Flowers small, fleshy. Sepals and petals free, spreading; petals usually longer and narrower than the sepals. Lip fleshy, pendent, immobile; hypochile concave; epichile wrinkled. Column shorter than the lip, stout; lacking a foot; rostellum short; stipes short; viscidium short, broad. Anther broad, 2-celled; pollinia 2, porate.

The genus *Luisia* was established in 1826 by Charles Gaudichaud-Beaupre in *Louis de Freycinet's Voyage sur l'Uranie et La Physicienne*. The genus comprises about 40 species distributed in Sri Lanka, India, Bhutan, China, Thailand, Indo-China, Japan, Malaysia, Indonesia, New Guinea and the Pacific Islands.

MATERIALS AND METHODS

The intensive field survey was conducted during the year 2007 – 2011 covering all the seasons of the year in the entire Darjeeling district including the forest areas, floral nurseries and farms of as low as Siliguri which is located at 150 m to as high as Sandakphu-Phalut located at 3636 m of entire Darjeeling Himalay of West Bengal. While working on Orchid flora of Darjeeling Himalaya, the *Luisia* Orchid species found were also studied intensively. All the relevant data were recorded in the field note book with their necessary information. The collected specimens were dissected and examined in laboratory during flowering period. Herbarium specimens were prepared by standard methods (Jain and Rao, 1977), specimens so collected were processed,

preserved and mounted on herbarium sheets and described, properly identified and authenticated with the help of the Orchid flora of Arunachal Pradesh. The Flora of Bhutan (Pearce and Cribb, 2002); Orchids of Sikkim and North East Himalaya (Luckson, 2007) and confirmed at Botanical Survey of India, CAL. Finally all the Voucher specimens were deposited in the Herbarium of Department of Botany, St. Joseph's College, North Point, Darjeeling and Taxonomy and Ethnobiology Research Laboratory, Cluny Women's College, Kalimpong. All the plant specimens were arranged alphabetically as per their altitude wise distribution in the area with botanical names, date of collection, voucher specimen numbers, habitat and phenology. Quadrangle plots of 10m x 10m for epiphytic Orchid species were laid down diagonally in habitat rich field to find out the current status of *Luisia* species from study areas.

Key to the species

- 1a. Lip simple, without dividing line between hypochile and epichile; epichile not suddenly widened..... *Luisia brachystachys*
- 1b. Lip 3-lobed, with a distinct dividing line between hypochile and epichile and epichile; epichile suddenly widened2a
- 2a. Leaves second (on one side of stem only)..... *L. filiformis*
- 2b. Leaves not second3a
- 3a. Apical lobe or epichile more than 5mm wide..... *L. trichorrhiza*
- 3b. Apical lobe or epichile less than 5mm wide..... *L. zeylanica*

Systematic Enumeration

1. *Luisia brachystachys* (Lindl.) Bl., Rumphia 4: 50 (1849). **Plant** 18-30cm tall. Stem stout, covered by leaf sheaths. **Leaves** 5-11 x 0.07-0.12 cm, terete, jointed. **Inflorescence** leaf-opposed, 3 or 5-flowered; peduncle thick, attenuate; rachis thick, 4-5 mm long. **Flowers** 3-4 mm long; sepals pale green, purple within, petals yellow-green, lip yellow-green to purple; pedicel and winged ovary glabrous, 4-6 mm long. Dorsal sepal 2.2-4.5 x 0.8-1 mm,

oblong, obtuse; **Lateral sepals** 2.6-3 x 0.7-1 mm, spreading, oblong-elliptic, obtuse. **Petals** 3-4.4 x 0.7-1 mm, narrowly oblong-spathulate, falcate, 3-veined. **Lip** 3.4-4 x 1.5-2 mm, simple, broadly oblong and winged at apex; disc ecallose or indented at base. **Column** 1.4 mm long. (Fig. 5).

Voucher specimen number: Rajendra *et al.* 1131; **Habitat:** Epiphytic on tree trunk and branches; **Altitudinal ranges:** 1000 – 2000m; **Date of collection:** 14 April 2010; **Flowering:** April – May; **Status:** Threatened in natural habitat; **Local distribution within Darjeeling:** Mungpoo and Mamring – Kurseong sub-division; **Geographical distribution:** N. India, Myanmar, Thailand, Laos and Vietnam.

2. *Luisia filiformis* Hook. f., Fl. Brit. India 6(1): 23 (1890). **Plant** pendent. Stem branched, covered by leaf sheaths, 2-3 mm thick; sheaths 1.7-3.2 cm long, tubular, striate. **Leaves** 15-19 x 0.4-0.7 cm, from one side of stem only, linear, terete, rugose, jointed. **Inflorescence** piercing through leaf-sheath 2-4 mm above its base, thick, 4 to 8-flowered; peduncle attenuate, sheathed; rachis 5-9 mm long; floral bracts 1.4-1.8 x 1.4-2 mm, broadly ovate, boat-shaped, subacute. **Flowers** 3-5 cm across; sepals white, petals white with yellow tips, lip deep purple with white edges; pedicellate-ovary 2-4mm long. **Dorsal sepal** 5-7 x 1.2-1.4 mm, ovate-elliptic, weakly hooded, subacute, keeled; **Lateral sepals** 6-7 x 2-3 mm, spreading, obtuse, ovate-elliptic, keeled. **Petals** 8-15 x 0.2-0.3 mm, widely spreading, filiform, obtuse. **Lip** 3-lobed, 4-6 x 1.3-2 mm, ecallose; hypochile broadly triangular to wedge-shaped, margins recurved, lateral lobes short, rounded; epichile arising from narrowed hypochile, broadly obovate, surface ridged, apex truncate to notched, margins weakly undulate, 3 x 2 mm. **Column** 1.2-1.4 x 1.2-1.5 mm; anther cap subquadrate; pollinia 0.7-0.9 mm long, elliptic-oblong. (Fig. 2).

Voucher specimen number: Rajendra *et al.* 0369; **Habitat:** Epiphytic on tree trunk and branches; **Altitudinal ranges:** 300 – 1100m; **Date of collection:** 12 May 2008; **Flowering:** March – May; **Status:** Rare in natural habitat; **Local distribution within Darjeeling:** Relli

river sides – Kalimpong sub-division; Kalijhora – Kurseong sub-division; **Geographical distribution:** India, (N.E. India, Sikkim and West Bengal), Bhutan, Laos, Thailand and Vietnam.

3. *Luisia trichorrhiza* (Hook.) Bl. Rumphia 4: 50 (1849). **Plant** 17-27 cm tall. **Stem** 4-7mm wide, stout, unbranched (occasionally branched), covered by leaf sheaths; sheaths 1.2-1.6 cm long, tubular. **Leaves** 7-16 x 0.4-0.5 cm, distichous, fleshy, terete, rugose, jointed. **Inflorescence** leaf-opposed, stout, short, 4 or 6-flowered; peduncle attenuate; rachis 6-8 x 3-4 mm; floral bracts 1.5-1.8 x 1-1.5 mm, persistent, broadly ovate-triangular, boat-shaped, acuminate. **Flowers** 0.8-1.1 cm across; sepals pale green with faint purple lines, lip dark purple, the base outlined with green lines, the apical ridges green, column purple; pedicellate-ovary 5-7 mm long. **Dorsal sepal** 3.5-5 x 1.5-1.8 mm, oblong, obtuse, 3-veined; **Lateral sepals** 5-7 x 2-2.6 mm, spreading, obliquely ovate to spathulate, acute, keeled, 3-veined. **Petals** 6-7 x 1.3-1.5 mm, oblong, obtuse, spreading, 3-veined. **Lip** 3-lobed, 6-8 x 4-5.7 mm; hypochile deeply concave with erect, rounded to triangular, subacute lateral lobes; epichile cordate, ridged, tapering to subtruncate, minutely emarginated apex. **Column** 1.8-2.3 mm long, stout. Pollinia 2, 0.8 x 0.4 mm, ovoid, yellow. (Fig. 4).

Voucher specimen number: Rajendra *et al.* 0791; **Habitat:** Epiphytic on tree trunk and branches; **Altitudinal ranges:** 800 – 1300m; **Date of collection:** 22 March 2009; **Flowering:** March – May; **Status:** Sparse in natural habitat; **Local distribution within Darjeeling:** Kumsi, Samalbong, Nimbong – Kalimpong sub-division; Mungpoo – Kurseong sub-division; **Geographical distribution:** India (N.E. India, Sikkim, West Bengal), Bhutan, Myanmar and Thailand.

4. *Luisia zeylanica* Lindl. Fol. Orchid. Luisia 4: 3, no.7 (1853). **Plant** 20-34 cm tall. **Stem** stout, covered by leaf sheaths; internodes 1-1.5 x 0.4-0.6 cm; sheaths overlapping, surface rugose. **Leaves** 6-15 x 0.2-0.5 cm, sessile, distichous, terete, subacute. **Inflorescence** extra-axillary, arising in centre of internode, on same side as the leaf, 2 to 4-flowered;

peduncle 2-3 mm long, attenuate; floral bracts 0.5-1 x 1-1.8 mm, broadly ovate-lunate. **Flowers** 3-6 mm across, pendent; sepals and petals green, mottled with purple, lip deep purple; pedicellate-ovary 4-5 mm long, slender. **Dorsal sepal** 3.8-5 x 1.7-2.8 mm, ovate, concave; **Lateral sepals** 3.7-5 x 2-2.7 mm, lanceolate-ovate, keeled, margins introlled. **Petals** 4-4.5 x 1.2-1.6 mm, obtuse, oblong-lanceolate. **Lip** 4-5 x 2.7-3.6 mm, fleshy, obscurely 3-lobed; hypochile subquadrate, concave; epichile deflexed, cordate-triangular, apex obscurely 3-lobed to subtruncate. **Column** 1mm long, stout. Pollinia 2, yellow. (Fig. 3).

Voucher specimen number: Rajendra *et al.* 0398; **Habitat:** Epiphytic on tree trunk and branches; **Altitudinal ranges:** 300 – 1000m; **Date of collection:** 20 May 2008; **Flowering:** February – May; **Status:** Sparse in natural habitat; **Local distribution within Darjeeling:** Kalijhora, Tindharey – Kurseong sub-division; Kumsi forest – Kalimpong sub-



Fig. 2. *Luisia filiformis* Hook. f.



Fig. 3. *Luisia zeylanica* Lindl.

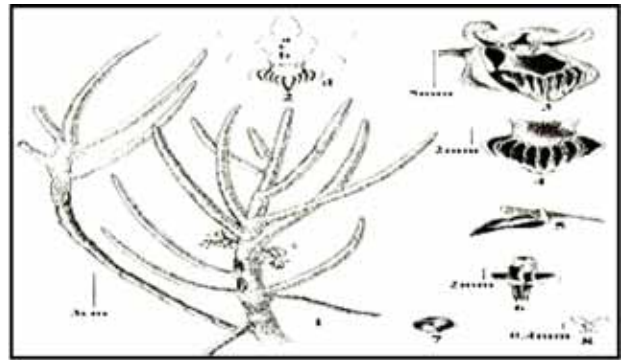


Fig. 4. *Luisia trichorrhiza* (Hook.) Bl.

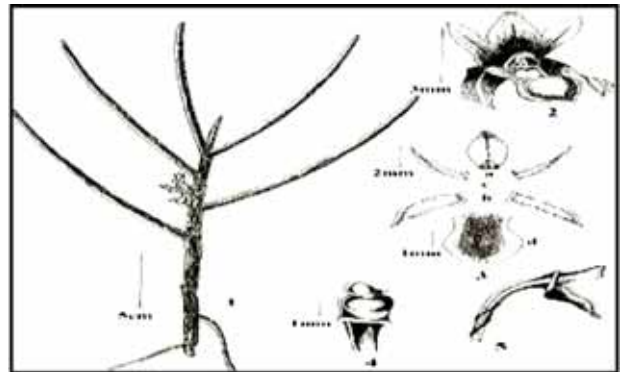


Fig. 5. *Luisia brachystachys* (Lindl.) Bl.,

division **Geographical distribution:** India (N.E. India, Sikkim, West Bengal), Sri Lanka.

Fig. 4. *Luisia trichorrhiza* (Hook.) Bl. 1. Habit (whole plant with flowers and flower buds); 2. Floral perigone, a. dorsal sepal, b. lateral sepals, c. petals and d. lip; 3. Front view of flower; 4. Lip; 5. Side view of pedicellate-ovary, column and lip; 6. Front view of tip of ovary, column with anther *in situ* and stigma; 7. Anther; 8. Pollinia.

Fig. 5. *Luisia brachystachys* (Lindl.) Bl. 1. Habit (whole plant with flowers); 2. Angled view of flower; 3. Floral perigone, a. dorsal sepal, b. lateral sepals, c. petals, d. Lip; 4. Front view of tip of ovary, column with anther *in situ* and stigma; 5. Side view of pedicellate-ovary, column and lip.

RESULTS AND DISCUSSION

During recent field studies in the Darjeeling Himalaya of India, four horticulturally less known *Luisia* Orchid species were recorded. Of them, two are sparse, one is rare and another one is threatened status at present in study regions. Flowering and fruiting varies from species to species. *L. brachystachys* flower during April to May and

available in an altitudinal ranges of 1000 to 2000m, *L. filiforme* and *L. trichorrhiza* flower during March to May and available at 300 to 1100m to 800 to 1300m altitudinal ranges and *L. zeylanica* flower during February to May and available in an altitudinal range of 300 to 1200 m from the mean sea level.

CONCLUSION

Orchid species are rare, threatened and in the verge of extinction from natural habitat in the regions. It is because of many reasons like random falling of old epiphytic host trees for fuel wood and timber collection and multifarious anthropogenic activities cause greater harm to the natural population of whole Orchid species in the study regions. It was observed that the luxuriant growth and diversity of the Orchid species in the undisturbed sites of the study area and the meager development in distressed sites clearly indicates the change or disturbance in the microclimatic conditions in habitat. The best way of protecting the remaining Orchid species resources is to convince people of the importance of their wealth. In India, there is a good law for the protection of such valuable plant species but law enforcement cannot protect these plants available in remote areas and in remote forests. Regular degradation of natural habitat, makes all the Orchid species

threatened status, and its distribution is very meager in the regions. Thus, their best route to their protection is if people living in far-flung areas are convinced about the importance of such plants. Therefore, it is necessary to conserve our precious wild Orchid species germplasm resources from extinction in natural habitat.

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